Notebook Series -- Pocket Notebooks
Notebook, PN-17-00-00

This pocket notebook was used by Edison, probably during the period September 1917-March 1918, for notes pertaining primarily to war-related experiments. Included are experiments, some conducted aboard the Navy warship USS *Sachem* in Long Island Sound, on sound detection devices and other means of locating submarines. Also included are notes on smoke bombs, kite rudders, Lyle gun projectiles, camouflaging techniques, the use of smokeless anthracite coal by Allied ships, and other war-related topics. In addition, there is a considerable amount of information copied from published sources, such as a table of the number of destroyers owned by each of the Allied and enemy nations. There are also references to the dismissal of experimenter Absalom M. Kennedy in December 1917 and to experiments at the U.S. Naval Station in Key West, Florida, where Edison resided during February-April 1918. A few of the notes relate to disc record experiments. Among the employees who assisted Edison in Key West were experimenters Albert G. Gerbode, William H. Knierim, Sherwood T. (Sam) Moore, Paul D. Payne, and Samuel C. Shaffner. There is also a reference to Charles B. Hanford, a retired Shakespearian actor who served as Edison's personal assistant and advised him on camouflaging experiments. The pages are unnumbered. Approximately 150 pages have been used.

PN-(17-00-00)

E 1710

☆2996

16
5.0
12.8
144
13-
43
144 20
18.7

When at Lab. find best vehicle for painting Lampblack to get blackest surface

also White to get colorless surface —

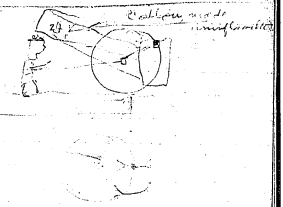
and Combinations of Blue in white to get Great sky blue

Dynamometer shows
1/2 Manilla rope
1 lb pull per 10 ft
1000 ft 103 lbs —
8 miles hour

The Torpedo shaped Buoy 27 lbs
at 8 miles hour

Norum says at 12.6 miles hour 11 knots
Torpedophone will pull
6.7 lbs = when same says
pull the dynamo 8 X 30

Backer

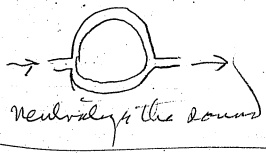


Mix flour of Na NO3 with the liquid fire to stop smoke.

Blunderbuss - 2" bore - firing cylinders of inflammable liquid 500 ft time fuse hot air and nozzle add feeder - also for liquid or tins + etc -

Henry Chemist say something wanted to stop rust of metal parts of aeroplanes —
Zinc paint —

Perhaps muffler Exhaust may be quieter as Exploding time fuse one device as long as the other



Neutralizing the sound

Steel wool may cut a bullet all to powder when shot into it —

Crozier writes that Army needs "tracer bullets" incendiary bullets armor piercing & improvements in premetro —

Frenchborough Wreck
Fired with shells
desired to salvaging
in a valuable coal shot
from gun, Legend Evans
for Stuff quote sold
Leaflets on boat -

Dr C.H. Williams Boston
Harvard University
Measure shade

235 pm - board on Dachau
at dock - Mirror -
Beam reaches clear
across from mirror
Rapidly changes angle
on board or mirror
loose

240 - 1" above Crack
245 2 "
248 - to 4" second Crack
251 1" above No 2 Crack
254 - 2½" 2 "

3 fam parallell w/ Crack
3 $2\frac{1}{2}$ 1/2 way between nail marks.
3 06 – up to 2nd nail –

6 mm to width of board
$4\frac{1}{2}$ inches
is movement on
End of 10 ft long
6×10 –
Longitudinal end has
shortened over a foot
in 6 months
Later · 3 12 to back
full length.
Something changed
now – $1\frac{1}{2}$ ft shrinkage
usually –

again ·
3 26 parallell –
1" ~~below~~ Even with No 1 nail hole
3 36 – 10 min $2\frac{1}{4}$ inches
moved 337 – full width
of board $4\frac{1}{2}$ " " min –

See if water from Nozzle surrounded
by cast oil well go further than of
only water – Vice versa

or oil cuts + Soap Sol Extremely antiseptic

Off Scilly's Area 160 X 160

32 Submarines kept scattered by Destroyers

32 ships enter + pass thru

These ships on a 5 mile vision will be sighted 35 times during if whole of 160 miles is made in daylight or 1:1 ships per submarine.

If these ships when they enter zone in daylight + stop, only 3 of them out of 32 would be sighted.

If 16 Submarines are operating in the area + still 32 ships make the voyage in daylight 20 ships will be sighted or .6 ship per submarine If the same ships stop when daylight appears + only run nights none will be seen in day time by Submarines

Oct 4 last
Arrivals at British ports
2680, sailings 2742
13 Vessels sunk by Mines or Submarines.

Beaufort Scale of wind

		nautical Mile	Wind Pressure
0 = Calm		0 to 3	0.03
1	Light Air	6.9	0.23
2	Light Breeze	11.3	0.62
3	Gentle Breeze	15.6	1.2
4	Moderate "	20	1.9
5	Fresh Breeze	24.3	2.9
6	Strong "	29.5	4.2
7	Moderate Gale	34.7	5.9
8	Fresh Gale	41.6	8.4
9	Strong Gale	48.6	11.5
10	Whole Gale	56.4	15.5
11	Storm	65.1	20.6
12	Hurricane	78 over	29.6

0 Represents a sky completely cloudless
10 " sky completely overcast

New Chart 24 trips thru Zone
Duplicate 6 times = 16.5 M

24 trips	normal Subs seen	Subs M laying still
1	14	4
2	14	0
3	16	0
4	16	0
5	17	0
6	20	1
	97	5

144 trips

Slot 7 mile radius 14 mile width
statute Miles

Now 24 Submarines

24 trips	4 day Subs seen	only night
1	22	1
2	26	0
3	26	0
4	23	1
5	23	0
6	25	1
	145	3

144 trips

34 Submarines
off Scilly by random
146 Vessels passed in 5 mile
Radius 10 mile circle —
Submarines if run in daylight
in Zone would have
seen 143. If they had
stopped at first signs of daylight
& waited till dusk & started
the 146 vessels would not
have been seen but by
3 submarines —

One reason why April may
1917 lost most submarines
longer daylights less rain
than in winter new lost
submarines —

34 Subs
10 mile vision radius 20 miles

67 - passages in —
143 Sub saw the ships —
If stopped days
9 submarines would
have seen ships

According to Chas of
there had been 146 vessels
300 submarines would have
seen the vessels
+ would have been
caught or seen on stopping
for daylight 19 times instead
of 3, as well 5 mile radius

If Cargo boats make trips from
England to USA & back in month
loss in stopping twice — 3%

a correction should be made for refraction of light at sea level on account of this which may 7 or 4 you can see 7 or further — average conditions sometimes worse sometimes less or better —

Wanted, number of vessels sunk, attacked weekly in Scilly area. This year & approx number of vessels entered in & out, above 1000 tons —

West Coast Ireland Harbor
Foilas Limerick —
Galway, Killary Bay
Clew Bay Rhys Bay Sligo
Donegal — Blacksod Bay
& thence to Lough Swilly
on North End.

75 Submarines Hopping and
29 voyages —
85 Sights — % 2.93 per ship
3 Caught & sunk — % 10% — .10 per ship

75 Submarines placed Best possible by Brown
32 voyages
72 Sights 2.2 per ship
6 Caught 18.7% +.187 per ship

75 Submarines placed by Brown
29 voyages
60 sights — 2.06 per ship
7 Caught 24.1% .24 sights per ship

~~Brought 1 ship sighted on Every 4 stop volume Running 60 my ship sighted twice -~~

(1)

32 Submarine

100 Voyages

14 mile circle

84 sighted day run

12 " still

36 got Home without sighting

Haphazard arrangement

(2)

about 5 over [illegible] Haphazard 32 Subs

100 voyages

82 sighted day

6 " still

39 got home without being sighted

(3)

32 Subs same arrangement as (2) but 10 mile circle 5 mile vision -

100 voyages

70 sighted running

none caught sleeping still

47 got Home without being sighted -

4

32 Subs same arrangement as 2 - But 20 mile Circle 10 mile Vision -

127 sighted -

18 Caught sighted still

20 got Home without sighting

Wear aircraft get French
Pilot Gabbs —
West Coast including
Brest

For sounding when approaching
short, tow a 1000 ft line or less
Buoy with diving rudder
Controlled Electrically
Thru low line, when
strikes balloons the
phone in Buoy gives
sound, tail death bag —
meaning preventing gas device

Radium letters
or numbers
buoys or storage
cylinders

[10]

32 Subs hunt
100 voyages.
3 mile Circle (fog cars)
1½" Vision —

100 Voyages
29 sighted.
none standing still

Theodores arrangement
100 Voyages
63 sights
49 - got thru } Running days
Only 1 sighted standing still.

Why Cant all destroyers be
like also Cargo boat with
devices which if Cargo
boat is ready to sink 2
destroyers can't chase it now
To hard work

as only 1/6 of the Cargo Steamers is generally lost, the other 5 Compartments not being able to keep her afloat

Get an English year book with almanacks Moon rises &c,

Get longest list of sunken of all boats since Friday — also daily Cables of further ships sunk

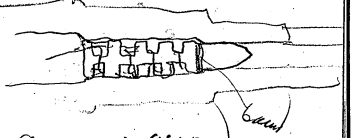
Last day before night run be without [illegible] & heavier Camouflage —

going to England — on account Federal Bonds 11 Knots is least speed for seg 9000 ton boat Cleveland bound from N York in ballast 8½ to 9 Knots least The standard speed is 10 Knots

see paper in my pocket about getting students Brooklyn Eng. high school making uniform forms —

It is probably possible to take observations when entirely overcast & sun cannot be seen by allowing the barometer to shine on a white board & with a vertical wire observe the very slight shadow giving height & direction

Projectile —



gases go around & press in on slower thus using higher charge

No 1 Camouflg	100 %
No 2 "	80 %
Smoke bombs 3" gun	80
Lyle gun smoke bombs	60
Kite rudder	50
Fake steamer smoke buoy	60
Torpedo detector Still	90% Wa
" " Boat moving	50
Submarine	[illegible]
Underwater propeller & fin	50
Antiaircraft Cook in Zone	100
Strategic	90%

Route no ships [illegible]
Normal Tu [illegible]
Coast send submarines
there. to do the big
Camouflaged. Commerce
[illegible]

The Cairo
1615 Q St

[illegible] ing 15 to Aug 31st
316 000 Tons

105 – $5 158 000 [illegible]
8. 216 000 yr
but average 576 000 small Tons

Average Tonnage of boats sunk by Submarines 2111 Sunk by mines 2236

Of all vessels sunk 4.3% are sunk by mines –

Yarrow results 172 Cases of
Fighting Dist M – attacked + sunk by
Torpedos 12
by Gunfire 5
attacks, damaged but not sunk 5
attacked + escaped without serious damage 65 – Observed Dist M but not attacked 86

British

		Over 1600	Under 1600	Total
Feby	24	15	6	21
Mch	3	14	9	22
"	10	13	4	17
"	17	16	8	24
"	24	18	7	25
"	31	18	13	31
April	7	17	2	19
	14	19	9	28
	21	40	15	55
	28	35	13	48
May	5	24	22	46
	12	18	5	23
	19	18	9	27
	26	18	1	19
June	3	15	3	18
	10	22	10	32
	17	27	5	32
	24	21	7	28
July	1	15	5	20
	8	14	3	17
	15	14	4	18
	22	21	3	24
	29	18	3	21
Aug	5	21	2	23
	12	14	2	16
	19	15	3	18
	26	18	5	23
Sept	2	20	3	23
	9	12	6	18
	16	8	20	28
	23	13	2	15
	30	11	2	13

Total in + out tonnage 1916 all English ports Excluding coasting + war vessels –

14-0 000 000 Tons

This is 383 000 tons a day

average boat sunk 2100 tons

gives 182 steamers in + out of all ports of England Ireland & Scotland daily – no foreign trade,

Feby + March sinking of Steamers

No Sunk in daylight	170	66·9 %
" Twilight	40	15·7 %
Moonlight	28	11·1 %
Darkness	16	6·3 %

Total Sunk 254

(10)

Cargo Boat saves 600 miles going Via Halifax instead N.Y. – or 2 1/4 days in the run –

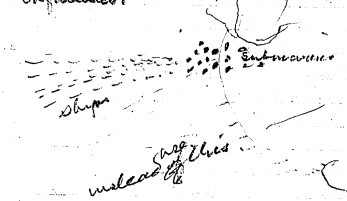
Destroyers 1917

	average tonnage	Number	Tonnage
USA	814	74	60 219
England	781	188	147 620
Germany	530	154	81 494
France	442	87	38 465
Japan	425	52	90 412
Russia	666	135	90 412
Italy	608	51	31 010
Austria Hungary	525	18	9 450

If 780 ships sunk from Feby 1st to Jany 1 – 12 months at rate of sinking in 8 months of 1917 1164 ships per year

Then Sunk in Daylight 778
Twilight 182
Moonlight 129
Darkness 75 1164

We are running into Submarine in massed formation, and in such a way that all our ships are unfolded.



Naval hydroaeroplanes are of no Value in blue water but only in green and there only over 80 fathoms, as reflection of light from bottom will be too weak to give the shadow

13 ships pass in & 13 pass out of danger Zone from Portugal to Shetlands daily as per USA clearances — (Boat 34 days for round trip)
This dont include ships passing thru Gibraltar
Hence 431 vessels Engaged —

Figure out arranging pilots on Vessels & Destroyers
also routing of destroyers
Pilots can go out on round back on Cargo boat
destroyers by destroyers at Gibraltar

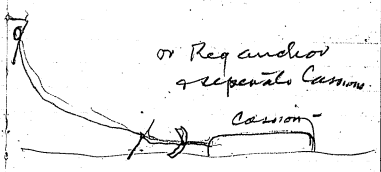
When boats stand still use small sight buoy to keep near to prevent effect of drift —

USA Vessels cleared in Foreign Trade

July 1/16 to July 1/17

Countries	Ships	ship average	
Azores & Madeira	10	3450	34 548
Denmark	215	2060	443 312
French & Atlantic	1087	2911	2.911 747
" Mediterranean	324	2500	818 780
Gibraltar	107	2500	269 504
Greece	72	2300	168 834
Italy	756	3000	2.273 736
Malta	2	2006	4048
Netherlands	528	2426	1 286 389
Norway	211	2370	499 436
Sweden	149	2060	307 291
Portugal	39	2000	73 846
Russia in Eur	72	3000	214 945
Spain Atlantic	100	2060	206 045
" Medtn	127	2280	289 676
England	1941	3883	7.537 471
Ireland	187	3390	634 505
Scotland	102	2605	265 938
Iceland	16	605	9.688

13 ships enter Δ Zone in + 13 out daily — from Coast of Portugal up to England —



An ultimate analysis of the shipping of England is reduced to one thing, to wit Coal which she ships to all parts of the world competes in this & the freight charge would be enormously increased as Coal is the Return Cargo,

As per US Statistics — Clearances for Portuguese & all ports north Europe gives 13 ships per day passing in & 13 ships passing out is 26 ships passes a point daily — Assuming a boat can make round trip in 34 days —
There will be 9490 passages 1/2 in 1/2 out
Each ship makes 10.72 passages per year (10) round trips —
Crossing danger zone 21 times!
This requires 431 vessels operating at once

Quebec	to	Kirkwall	2679
Quebec	to	Jory	2540
Quebec	to	Liverpool	2647 n
"		Plymouth	2665 s
"		Fastnet	2545 s
"		Scilly	2678
NY	to	Queenstown	2876
"		Plymouth	3002
"		Havre	3249
"		Gibraltar	3225 — 693 Marseilles 3918
			860 Genoa 4085

Gibraltar to Marseilles 693
" Genoa 860

NY to Bordeaux 3318
NY to Pentland or Kirkwall 2977

Cargo Boat,

Draft 24' 6" Rated 3630 Tons actually Carries to Plimsol Line 5000 tons Now loading 2' above Plimsol line — Increases this to 5700 tons or 14% increase.
or 57½% more

166 in + 166 Vessels out of daily British ports, made after arbitrating those sunk by Submarines

~~Approximately from Lloyds Reg 1916 a tonnage of British Steam Vessels, lost, broken up etc for the year was 249 428 tons. 1.9% as against 36% by submarine~~

All allies + Neutral shipping
963 sunk by Submarine to
3.69 " by Collision
or 91.48 sunk by Submarine to
.852 wrecked

English Torpedo boats
105 burn oil 110 use Coal

French 24 use oil 69 use Coal

American -
53 use oil 21 use Coal

Night runs in Channel put dazzlers + noise apparatus mistaking Destroyers, on Cargo boats — Sail boats Can by

Good French Ports

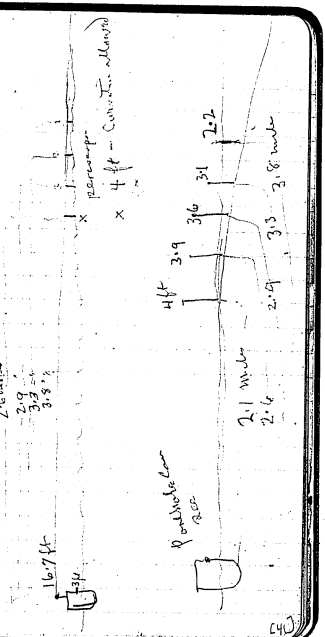
Quiberon
Rochefort
Ile d'Aix

Rade de Trompeloup

Ascertain on glass in
Salt water how soon
film water clears off
glass so vision is OK
right in seconds.

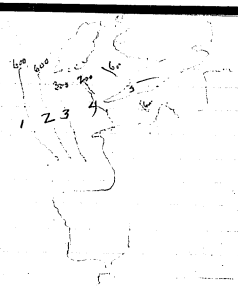
Outscheme Two Dragoons
3" 2 1 & 1/2" diam

Pick upon hole visible —
Distances in which stroke seen 4 3 2 1 ft perpendicular
against sea background —
2.6 inch
2.9
3.9
3.3



Depthing on claim of climing up water
for brave rubble drop that speed
13 inches

Sea Naval & Military Record -
May 16 1917 - Edward on 6 raises
item - Barometer & inefficiency
in Navy - Dainty alarmed sea ft



Rough Approximation -
30 min Basin -
If No 1 Barrage 600 Miles " 20 Destroyers
11 boats to Destroyer -
No 2 Barrage dells
No 3 " 300 miles 10 Des 22 boats
4 200 7 " 32 "
5 120 4 " 56 "
13 hours rest progress 600 miles
Each 4 Boats [illegible]
54 hours of no slip 106 hours with
stops 51% efficient against 60%
on Convoy

Lloyds 1917 shows in
Mech. Book 6082 sailing
vessels
Approx 15% are above
1000 tons

This would give
912 sailing vessels
made up of which Engines
Condition or Sail only

of 900 ships sunk
Channel Scilly across to
French & West Nashant
sunk 21.5 %
Nashant 3.5
French Coast 12.0
Making Scilly 20.0
" Fastnet 26.5
83.5 %

10% on East Coast England

129000 Voyages per
year from England
but + in per year to
foreign Colonies

130 Voyages when boat
is sunk

352 Ships Steam driven go in + out
daily from all
English + French
Ports. Coasters are
NOT included

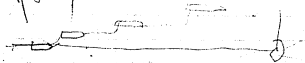
Find out if 5000 Ton Cargo
boat loaded 2 ft above
plimsoll mark in Calm pen
sink to within 3 ft of
top of hull by taking
on Water in Coast.

At night around
Harbor 20 miles
area - Have
Distinguished navy
appearances
Covering the Area

find out from Mami
when from the front.
all about depth of
wave Entering channels,
also average width
apart of trenches
1 2 etc -

GREAT

Sailboat dead on to
Sun or on the Sun
Circle, then both sides
individually lighted & both
Equal, to keep Course
Zig Zag



Can steer by Compass
& shadow
(why Cutter ship be steered by
= Shadow)

Steer all day & straight
to sun + stars all
night —

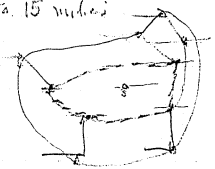
Light Cargo boats with
a square mast + yards
as 25 ft square sail
see bigger smaller boat
with Spill Knock down
mast can see + tow
use in fog —
test it on Sachem
Can use [illegible]
[illegible] to [illegible] Canal

Yesterday to 1st June 8.638 500 tons
Arrives 8 259 864
Dif - 378 000
but allow due repts Sept 1st

Nantes
Sables d'Olonne
La Pallice
Le Verdon
Royan
Trompeloup
Bordeaux
Bayonne
Quiberon
Port Louis
Lorient
Concarneau
Douarnenez
Santander
Bilbao

available
friendly
Harbors

Whenever a destroyer on SOS or otherwise finds a sub, he is to radiate out a general message to ships in coming at sub within the circle. ta. 15 miles



946 sinkings in 9 months.
The 633 ships now building in W'Va, will last if furnished as fast as sunk up to July will all be gone by May — or 633 will last 6.65 months
it goes by Number & not by tonnage

Get Lithograph print like French showing whole area of Sub W'ce from
Make out daily chart in book form from 1st July

When get chance at Lab
Steel Trying on disc from
Hot Ball, Req disc process
Tel room [illegible] for crystal detector [illegible]

find out where funnel
was ~~[illegible]~~ attached or when
(10) time

To stop Sparks, add
a weight to diaphm of
Disc Receiver until Pitch
of Muffling is recorded.
also try smaller Chamber
alone & with weight.

If Req straight voyage is
11 days or 6 days load &
unload – Total 23 days
100%

Then on Coasting – loading in
ports

12 hours –		1 day	97.8%
24	"	2	95.8%
36	"	3	93.8
48	"	4	92
60	"	5	90
72	"	6	88.4
84	"	7	86.8
96	"	8	85.2
108	"	9	83.6
120	"	10	80.2

Steamers carrying petroleum

Tons		
1000	9	9000
2000	49	98000
3000	68	204 000
4000	70	280 000
5000	86	430 000
6000	53	318 000
7000	41	287 000
8000	10	80 000
9000	3	27 000
10 000	17	170 000
	406	1.903.000

Sailing Vessels carrying Petroleum

Tons		
1000	19	19000
2000	21	42000
3000	3	9000
4000	4	16000
8000	1	8000
	48	94.000

Sailing Vessels gross 1917 Lloyds

Tons	Number	
100	1349	134 900
200	1400	280 000
300	651	195 000
400	354	141 600
500	242	121 000
600	166	99 600
700	194	135 800
800	132	105 600
900	128	116 000
1000 + over	930	1.581.000
	5.546 - Vessels	

Can shadow out by sun & moon as well & probably twilight & in any direction

We should be sure of our radio Opers. as they could give a good position

[55]

1913

1913: Steam Vessels		Tons gross (35 @ 50% more for carrying)	net	Average gross tonnage
England & Colonies	10 009	19.849.167	12.025.570	1984
USA	1 209	1.575 223	915.950	1300
Austria	419	1.010 347	629 444	2410
Danish	552	711 094	415 880	1300
Dutch	661	1.256 742	794 840	1940
French	987	1 793 000	1.029 113	1810
German	2 019	4.743 046	2.877 887	2340
Italian	591	1 274 000	773 848	2150
Japan	1037	1.500 000	956 702	1440
Norway	1597	1 870 993	1.122 577	1170
Russia	716	790 000	463 000	1100
Spain	547	826.000	506 000	1510
Sweden	1043	943 000	551 964	904
	21088	38,722 412		

USA dont include vessels on lakes

How about twice size Anchor + 3 times more Chain + bigger or if head wont wind ft 2 anchors

What Count Effel Tower & big Marconi Stations give bounty or Continually practicing of Sub sighted, attacks etc

Dachem Explo

1 = Mast light

2 = Canvas against sun (sailing)
also Stern Canvas – + Pilot Hu Canvas
rapidly changing + fastening

3 = Kite Rudder taking + also
side in bow + dropping rudder

4 Measures sky line all
directions clear also, cloudy
also Woods, shore line

5 Lyle gun projectiles

6 3" gun smoke bombs

7 Fake steamer
1/2 = Turn Smoke 1 + Kite + get lines
then, fire again, burn + stop engine
see + shoulder – then Fire Rescue

8 Dynamiter

9 Big Shutter

10 Magnesium Paint –

Nov 8th from Feby 1 to date
1027 ships sunk all over world
by Sub –

109 on East Coast England alt 10%

Rosyth & Coast Scotland
great Naval station –

Hurley = Crawling Sailing
Iron Gerry – Wrecks
not speed 15000
Easy 2 500 A.P. Tug
Trawling Suspicions

250 Sunk in Channel
prisoners since Feby 1917 to
Oct 30

Dissolve TNT in a Solvent then precipitate it in a Volatile liquid not sol water & dry slow to get it Excessively fine to see if quantity used wont freeze so it would give an Explosion of first grade

Barges towed by Ocean going tug in good weather to French Channel ports

Capt W F Halsey USN
Room 178 Navy bldg
Phone Branch 266
Bur of Com & Transport
Mine Division, Rte

1084 Ships on N of Spain sunk in 8½ months 450 of them sunk by smaller Subs & 630 by Ocean going Subs

In 1915 USA had 26700 Vessels
Average Gross tonnage, 314 Ton

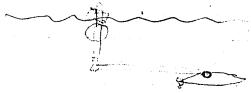
		Gross T Average
Sail wood	5706	190
" Iron	160	1550
Steam Wood	4.671	195
Iron	2281	2130

Dr wood Expert Spray
Soft swamp ground with
Water & [illegible] years &
Continue thus than cover
with dirt & Continue till
get [illegible] degree of
Heat [illegible] for burning
tail

Kennedy need address
care
Stamford Motor Co
Stamford Conn

James Hussey
Marine Architect
Greenport L.I.

Sec of Anhydrous Arsenic
acid is solid or liquid also
fumes in air & with
Sodium Cloum also of
Arsenious acid solid Cloum
or Arsenic acid for
Smoke shell.



15 ocean going Barges full
Coal leaving at Buffalo Canal
go [illegible] tugs now
flying [illegible] Navy Yard
[illegible] —
DRW will stop canal soon
Rankin 7' 6 will go down —
Chesapeake 9 ft - [illegible] 2 years
Rankin only [illegible]

Erie 300 @ 500 boats
240 Tons - 94" ft long
17' 6 wide 6 ft draft
owned generally by men in the
lower northern — Towed by
steam owned tugs 200 [illegible]
200 additional boats around
NY City for lighters & storage

Boats old & only fit for
low grade ft Coal Lumber etc

Lehigh 86' 6" 10' 6" 5' 2"
draft - 98 tons - 190 boats

Schuylkill Canal
36 boats put in Canadian
quickly 12 more by labor
106' 6" 17' 6" 5 ft draft.
Single boats 165 tons
Double 125 tons Easily -
Erie - 500 - Lehigh 190 Schuylkill 48
others 5 9

Champlain Canal has boats also

~~Onondaga~~

Ask Daniels to find out if Navy has tried any tactics against Dynamite & expulsion

Ask Department who has flame projector in charge — also Viscously & gasoline liquid hand Sheppard Daniels has

show Cropper Zime dope ask if any use to him to take box to office

See Lyne Black about Canal boats tugs etc —

Tell Daniels about Relcos setting down fuse & TNT Dobbins

Tell Lieutenant Dept about Australian & ~~Dardanelles~~ Gallipoli

Wolfe always claims
Chase with nice
idea —

Ask Senator if he
got Albuquerque map
& when —
say no statistics of
Coasting trade,
on oil from
Mexico & Isthmus —
& if any Gentleman of my
Albuquerque map
Give French Michelas
Attache nice smile —
Thank Nicolay —

While Mexcraft
to let Kennedy go a
day will pay his
salary for reasonable
time this permit
him get a job —

get oil data from
Bureau Commerce

Chicago is acct
generally 6 days
4 days in Front
uses 200 tons oil
40 driven — Thus exists
for 6. 7 Orl & Stos mouth

Dannels about Log bombs Submarines

Disc - Specially prepared
Linseed, Cheese cloth and
Etc Then mix some oxidizer
like fine Perox Mn, Pb, Fe_2O_3
Etc which will Crack or heat
in pieces - Resinates
high ~~softening~~ point -

Get a Copy of Our Letter
to Gregory for use in
Washington -

Heavy Seine Coal barges
across Channel at night
in good weather powerful
tugs - Rhone to Mediterranean
thence Genoa Coasting vessels

Gallon 1 lb TNT
shoot at it when in
right position -
Nights - reflare -
triangulate light behind
so Enemy Cant see it
Country

Dirigible goes ahead
+ drops a Column
Smoke screen —
possibly - black smoke
possibly a Compressed
air spray of Chlorine
bow of ship Vertical
would make a
haze —

Smoke bomb saturated
Solutions - Calf
Nitrate.

Experiment on producing
a Haze -

Strategic Map for USA
Land, - Ford Transports -

Foreign Labor for period of war
only

Mexican - Jamaican Negroes
Porto Ricans -
Haiti - Canadian
Siberian Russians via San Fran
Philippines - Hindus
Norwegians Icelanders
Belgians Interned in Holland
Aleen Indians
Japanese - Portuguese
Poles Czechs Bohemians
Prisoners of Russia
via Mesopotamia

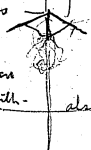
Hose lowered to Enemy trench
+ Centrifugal pumps
+ Clay water, flaso
trenches –

Flammenwerfer – wire with
wick – French chalk, asbestos fibre fine

Lewis Gun big foot
accessory rises +
100 defs shaps on
parts +

Convoy of shelves going
~~20 to~~ 1 foot, [illegible]
wood at base of [illegible]
gauge wire destroyer
[illegible]

Nights – Aeroplanes high –
Drop balls catching saturated
with burning liquid –
to light up trenches – then drop
Bombs –



Reflector –

Lights when
strike with –

Sling on ground
also for throwing bombs

Try on Crows nest with
scope to see into
water better –

Try Crepts on Sachem

160 miles

Ships	1	3	5	7	9	11	13	15	17	19
	2	4	6	8	10	12	14	16	18	20

100 passages using these 20 Cards
8 Sights in 1 & 2 92 in balance
$12\frac{1}{2}$%

Tell Thomas on his Sailors
friends have some Split
Tickets to show Audience
to explain Lecture in
parlor —

1	3	5	7	9	11
2	4	6	8	10	12

25 + 5 — 30
25 + 5 30
25 + 5 30
9 + 1 10
100 — to 16 —

13	14	15	16	17	18
1	3	5	7	9	11
2	4	6	8	10	12
19	20	21	22	23	24

100 deals —
93
7 sighted —

I notice that had over 60 passages before. I sighted then answered sighted clavel & gallon Bad shuffling I think —

1	2	3	4	5	6

13 supplied, [illegible] 01

87 –

6 cards

Shook 1 dice in the 6 following

Tried it 6 times.

	101	supplied
No 1	89 –	11
No 2	82 –	18
No 3	79 –	21
No 4	90 –	10
No 5	84 –	16
No 6	87 –	13
7	89	11

Discs - Very smoky decorated Silicate, Un
not and weak or very slightly
a muddy white water as a rough
~~pressed~~ as a disc a [illegible]
Steam. This poly Carbon.
water observed [illegible]

~~How about Hypsometers
Zeros [illegible] 50° for
warm - [illegible] better
[illegible]~~

E

Prem -

1	2	3	4	5	6
7	8	9	10	11	12

Not sighted 11 times -
obtained 89 times.

Took 6 dice in 1 bag Threw all together

1	63 times
2	66 "
3	72 "
4	71 "
5	80 "
6	63 "

6 Throws

1	90
2	102
3	108
4	103
5	102
6	101

101 Throws gives

(1) 32 addresses the 69

Dont forget to try all high Mt Rizzuto, daylights etc with Sal ammoniac Naphthalene to open pebbles or dices —

Chloramides Reaction is the Sbounta, [illegible] & heat see Vol XXXVI No 13 p [illegible] Chem Soc Jnl June —

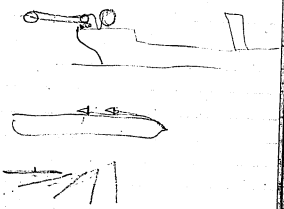
Nickel process — Grand Mallee Oxidizing — ignite to full yellow to make NiO used, then dissolve in 2% H_2SO_4 to extract CuO & Fe_2O_3 —

Chlorinated Rubber -
Rubber dissolves Carbon Tetrachloride
a Chlorinated, gives a
plastic substance
US Pat 1.234.381
July 24/17

Nitrocellulose - get
solvent - use dissolve
& mixture to make
plastic -

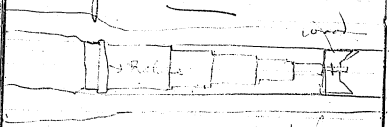
Some of the Canned Goods
May dissolve, use in
mix & powder - Disc

Trolley Pole for
phone booth



Resinate of lead or zinc
Rosin etc dissolved
Asphalt - for disc
instead from -
to Reuse MP Ball
plate of it like Victor
or Regway using
3 times as much

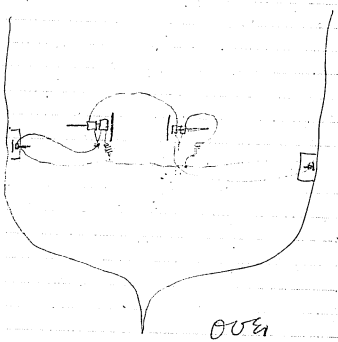
Resemble the powder
mixed with fuses in
Rolls hot. This has
high MP -



or other light
substance -

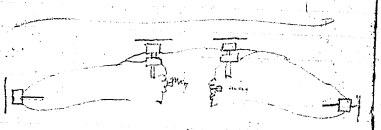
Split so wind does it.
TNT + more to explode only
when behind wreck or
Quit -

If subs are [illegible], can only
be seen 3ft above water
Here, this gunners must be
there to verify gun + gun also
How about this -



over

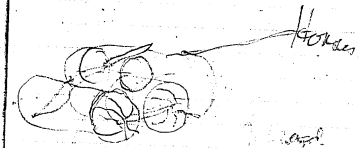
Think can regenerate Horses discard blanks -



Magnet [illegible] on [illegible] line to balance [illegible] in order each side of boat

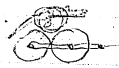
Bridge method:

Let the sea anchor come out by a brake to prevent sudden shock at first force to permit setting the first on brake



Cannon

Groove of cannon wheel



from Aug 8 1914 to April 26 1917

Neutral ships 32%

Sunk

By torpedo	697	18%
by mines	152	
	849 Total	

Dutch	76
Swedish	109
Norway	436
Dane	94
Spanish	35
American	20
Brazil	2
Greeks	6

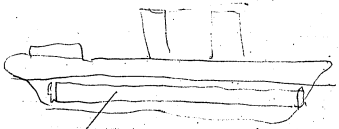
Argentin Peru Uruguay | each

No get greater accuracy in shell why not have a heavy hound at each or 1 and release on rotation will exactly balance the shell automatically run where lighter

out of balance by not being true & eccentricity of loading of Explosive -

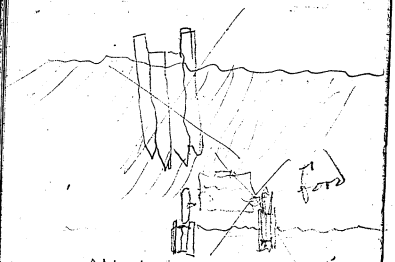
Also in big guns a definite frame work all of smokeless powder exactly fitting gun So its one mass & definite always burning at same time (Geo)

Disc Use Sulphonated picrandum as they dont melt but soften -



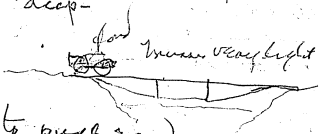
Canvas bag flat shield against sides of boat with air in Reservoir under pressure phone hears torpedo hit on

Protector plate with 3/8 holes with Cap & black powder all on a plate, when bullet strikes lowers Spring by Counter pressure & 6 detail jacks penetrate plate.

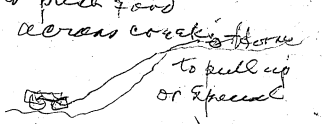


Military road in field.

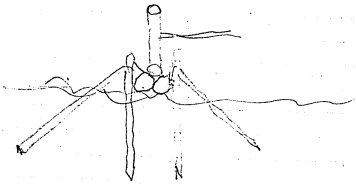
Fords, 5" tires corrugated deep-



to push ford across creek ~~or stream~~



(into alternate) Wire



Daniels -

Young men, not above 35 - Eyes glassy, bright, clear, personal movements quick, nervous, no drink, [illegible] commands - Old men to OK.

Sims, Geddes, Rear Admiral Daniels,

Breathing tubes 25 ft high 1/2 - of pipes coated with charcoal for emergency

Peroxide lead & dry glycerin
Sulphur gun cotton for detonators
TNT - acetyl[illegible]

0002 Sheet iron or may be Copper Brass Wedge only breaking just to splitter wrapped 2 layers 1/4" steel & with Connecticut woods be 4 @ 6" thick to stop bullets -

Run pipe to within 20 ft of Enemy trench & force CO thru porous sand

Sharpeak (special) which in bursting throw out bullets at rate of 500 ft. 200 1000 ft to break glass of Periscope etc - Some with black stuff Wood I

Chain Shot

Chain -

Outside shell $\frac{1}{4}$" mm dia - wind friction. Cause separation gradually & not break chain -

Fire 4" gun 8 @ 10 mch. above water line long projectile, percussion fuse, few lbs TNT, ships along & is bound to hit 2000 yards or so - need not rotate as it will run

probably humble of ok. Could have on hinge Rudder on - Sub Comm tower or part above water -

See Moly about Hydrogen Generators or Buffing - Saw Dennis

Great for propaganda

S America

Scandinavia

Mexico

Southern Hotels

Orient

Think can stop all rest to a Dreadnought by 4 record Mortars for bullets, & different amounts of ~~[illegible]~~ powder —
Using ship itself to fire Mortars —

Plan 8 Zig Zag
Change course every 5 min —

From Minutes	to Min —		
0	5	15	0 to right [illegible]
5	10	45	" "
10	15	15	" "
15	20	15	to left
20	25	45	" "
25	30	15	to right
30	35	45	" "
35	40	15	" "
40	45	15	left
45	50	45	"
50	55	15	"
55	60		

Use Machine guns to break glasses of periscopes
Easily hit by froth of water thrown up by bullets 20 sec lowered up to periscope
should be ok for Summer work

Send to Duchess
10 Condensers and a lot of Resistance Coils for adjustable table to Cancel out all rapid sounds from sea on shore by Tuning

Why Cant small pipe intake at
Extreme end of sub be connected
to Compressor + ~~pump air~~ bad
air from boat pumped into
block + at same time fresh
air from flasks allowed to full
let out at other extreme end
doors being closed + only
leaks equalizing pressure
all tanks blowing kept
full of air ~~except~~

Vickers gun on deck
handle down to Bulls Eye
below, Operators strapped
to Eye. Man above
feeds gun man below
arms, possibly
phone from man in Gun
waist to Bulls Eye

Could use an oil spray
bulletts get oil on it to
make ricochet ~~of bullet~~
wake more apparent.

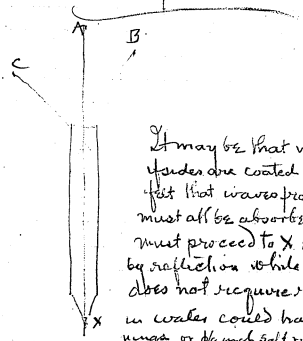
Tell Daniels wood
sash next Armor

Battleships fighting make
lot false splashes all
over both sides eg —
Small Explosive Shells
so Enemy Cant get
range by splashing
also low down
Olenn smoke so
they Cant see splash

Shaffer - dome set in
pressure equalizer
phone to shore through
depending water on
Microfoni - ~~of~~ absorbant
to take up most sequence
out by compression
of air —

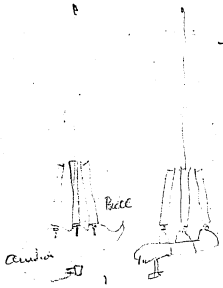
Hammer knocking on side
ship ~~4~~ defend loudness
Pilot of board hears
at front boat ahead
his own being cancelled
out, if he hear all
he is too close, if only
the loudest he is ok
if none he catches
up — Each boat
makes sep sig —
must not meet one ~~from~~ up

at Keywest try white cloth
10 ft square very dark
night & illuminate it
with faint light, need
white & see how far
can see, blinds on it
to take place of red
green light.



It may be that in tubs
under one coated with
felt that waves from C+B
must all be absorbed as C+B
must proceed to X entirely
by reflection while A
does not require reflection
in water coned have
rings or 1/8 inch soft rubber lining

Next number for ~~Jerry Daniel~~ is 46.



Try at Key West.

brass tube 2 ft 1/2" wall polished: mirror

adjustable to a focus –

Make shore experiments from anchored boats to get some fundamental data –

Night fighting throw brilliant shell illumination flares, min 2000 yards or Catch Torpedo boat trying to force in Schemitts this better than Arc lights, use Towing phone 16000 yards 4 pounds one after another

Are numbers over 35 yet limit

Why not put voice tubes & telefoni wires in tubes laid on both sides along side ship under water, & use no active side this almost practical thing —

Also why no use wireless ship with hearing or recognetic. Oscillation + tuned receiver Dot + dash, Never could be quiet act of Eng —

See p 199 Report Battle practice 1906 — also 197 Kansas completed 1911

219

South Carolina, Lieut Comd. Hepburn & Lieut W. A. Corlay —
p 226. 242-3 —

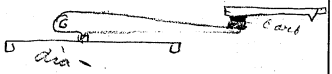
At 20 000 yards & wave 09 is 400 yards

Voice tubes 326-7-8-9
420 on
See Flowers Communication on telefoni — 331
also South Carolina. 332-3
Hepburn again — good service
See 358-9

possibly revolving water phone 1 per second get a compound wave + this in presence of another ship would alter the sound very much
Could do it on Recg phone partially

Next number 55 next.

Figure out in microfarads have larger average to take advantage of great [illegible] [illegible] [illegible]



Battle Practice 1916
p 388, Bad primers,
Holding propellide in gun when firing high angle
389–390

Tracers dont function
390.
arc lights 408.

to trace torpedos at night fire out powders
Calcium Phosphide in jacks → Cause fired to head →

Battle Practice 1916
[illegible]

See 461 – 493 –

For dragging for lost torpedoes use flexible Chain or wire 6" apart ½ P ½ neg

Fire a lee gun over short cliffs

572 — 175 about Range Finder book

At Key West see Subs & ask how long they stay up on the sighting of Cargo boat which they porpoise & how far & how quick sea water leaves glass clear or do they & Cool at clear — practical demonstration can see a ~~porpoise~~ ditto Cargo boat,

See Knerr looking through a tube 1" dia then 1/2 then 1/4 & times. passage of a vessel Can not get speed

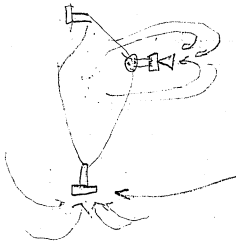
Phone — Lampblack

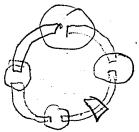
Moore at angle so small too no of inch makes full face Contact, always principle.

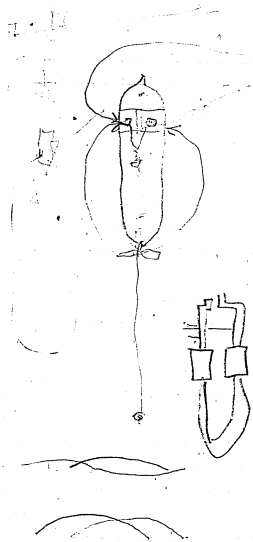
Can print charts of Black & white stripes or in morning Can paste them on Hull bridges & masts & change in 1/2 hour all hands working

Victor System disc Varnish over everything Condensers exp. Masts dry working no use

Blasting bell + cord
mounted, ~~to~~ 7q,



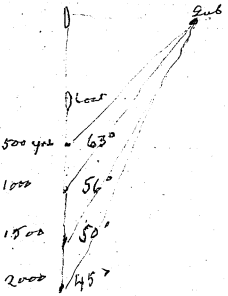




Pull Byron Phone Cable
alone no boat
500 ft 32
1000 64 only slight
1500 98. drop between

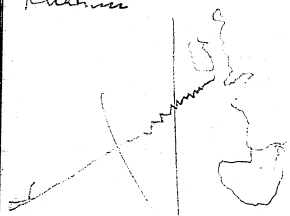
Cable on Cone & block
waxed Cable, white
best by 2 lbs —

2 Red lights. 1 strong
the other very small &
fed with Arthur Use
shutter between
to signal —



Show best angle for mouth
piece of phone —

Kneeman



Why not don't go round
15 min etc – so such
cant take readings

See about Cordon
lights to drop from
aeroplanes –

Lt. Dixon UK K-L #35
He has Parachute.
Lt. Comdr. Olding (automatics.)

Ayres Telescope –

Heidaschneider Opera glass

Windchop when
pitching best glass
to use on glass

Magnetic davits
Inter brat.

Porcelain outside
Wrecked Cracks
above — spark plug
porcelain broken —
spark points pitted
Central Contact

Very slow powder
for making compression
air — for starting
compressor —

Desk of submarine
+ then command of
of Wireless installation
aint done —

5 ft square block
lists on wheels
Contact by magnets
+ Keyboard magnets
by day on shelf

phone & short funnel

differential phone
to Cancel out Coast
sounds

or bridge

possibly a phone across
near to ship plate + no
amplifier but ship's
wireless + Reg tower
phone 4 & another
4 Bell –

ship itself is wireless telephone sub as no amplifier
but does not sound signals

also could find source of specific
sounds if use phones near thing
to Cancel out –

swinging gun 50 Lbs

Moore try 2 micro under water
in series with same current as
with 1 – see if increased
when at Etiene –

All the Sailing Vessels in U.S.
just under 1000 tons

50 Tons	302
75	209
100	254
150	92
200	87
250	60
300	75
350	52
400	66
450	44
500	110
600	113
700	140
less than 1000	178
	1752

Cargo hatch running off on yds
apparatus drops Olive oil on
Phone disabled astern by ex
disappears in definite time. Every
20 seconds.

Lights very high note in resonant funnel
under to make it disappear to get
distance & wrong to get direction.
Possibly The Redmont Mirror Opaler
with Edge well do it, also use opaler
at 10 per second with opaler –

2 CP light –

2 12 hour tubes ESB
to light it – lowed by Cable
wet Electric
about size as my
Phone to get, for steering
let Cargo Cranes at night

(185)

Curtiss R6 Sea Plane 49 79 384 ft

Pilots ear to surface of water when machine stationary in water. 8 ft

deepest draught of fuselage 1 ft

from Pilots Ear to bottom of fuselage or body of machine in water 4 ft 6"

Lawrence Grant White —

Use long tube 40 feet to get direction place front strong all angles reduced

3|840 / 280 3|1140 / 380

by friction.

Swing tube 100 times to get Exact Zero.

4 Sea Anchors 280 yds Good Tow Boat

Just with Tow Line 10 Knots 380 yards 1140 ft 1760

1	7x4 Sea Anchor	280	840	1400
2	"	220 yds	660	1100
3		183 yds	550	1012
4		157 yds	470	881

Ship 880 up 41 ft on 54 knots

with 4 sea anchors —

Yacht must have worked 550 yards to hit supposing he had reached speed of 10 knots

Thus with 285 ft good tow boat.

Have Langley rewound
2 bell phones one
flat 1 long
4 Coils 10 ohm
each on spools
with screw posts
so can use coils
multiple or series

Design Sectional
French mortar
15" shell –
50 lbs. Krupp piece
Light shell –

Hurley – clay rods
in Cargo compartment
bottom to top to withstand
air pressure – or brace
on Crow possibly
air light. Hatchways
stop air – if any
air plates open for
V Equilibrium or water
outlet device screw
for closing –

One man torpedo –

Use Centrifugal shaft to throw water out & make a funnel for air

Thompson

I havent got mechanism of sound as tube of Mercoid longer

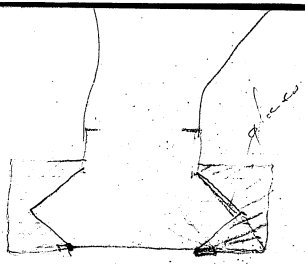
Look at object with Spectroscopic telescope then on dark line see if they are illuminated when arc light thrown on object.

To find position at sea at night look at star & throw a harbor light overboard in direction of star & sail in line

Newman says carbon mirror can be used & throw light anywhere

In an advance, men behind use bombs to blow holes for front men to retreat to

O Eun



Dia — Shape of Chamber to achieve what energy is worth.

12 noon — fairly plain — Navy glass — CMOR worst on — seems to be higher than 5 ft. — Can see it OK with eye 2 ft away from eye piece

520 pm — Sun is now — Can still see periscope but not strong — getting dusk — Sky line light lead color —

535 — Can't see it. — Sky line cloudy + dark — Creamy — now dusky but can read newspaper

Next morning 6 30 am — Sun up behind cloud — Sky line + cloud line look almost same bright — no green or blue — Can't see periscope —

perhaps a little worst of Dur Worth —

When sun is out at 7 o'clock the sheen from water + light from sky line almost alike no horizon line, actually looked like a most good water. No green or blue all reflected light with water not quite so bright as sky line. This is best time for perman when periscope is north or apparently just as good west

7 AM no aegus or 6 Peri

7.10 can just faintly see peri —

7.25. Sun free clouds cant see peri. Water + sky line blend + see like a mirror or same but as sky

Light clouds all over
Sky blue spaces, 1/4 cloud
3/4 blue, sun comes out + out

8 AM sun behind cloud
Cant see peri —

When sea is glassy
Sky + water line have
somewhat same color
but where surface not
smooth best fall ripples
it looks darker + is
distinct from sky line
Color, so glassy surface
is noticeably factor
Perman, +

Microfone

Metal - Mica or hard
rubber - gold leaf -
Chg with 3 to 6 cells, 1 second

wave varies coulomb
of gold with dearlectric
Use Audion —

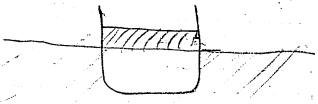
Why Cant an audion
be worked without
induction Coils

or Condenser at X
Try it —

10 am Cant see peri
semi glassy sea seat
sky two very little def in
but can scarcely see
def with naked eye
there appears hazy

Evidently must see peri
in shadow, or roughness

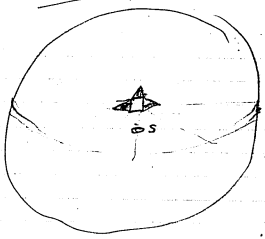
Indications in South west
water not glassy ~~blue~~ green
big def between sky + water
line but in NW where
peri is water glassy
+ not green no clear line
Whole bumbla seems to
be glassy sea line —
SW sharp NW Hazy
due to this —



Average heights of Cargo
above plimsol + waterline
5½ ft on 4000 Low Cost.

1 pm. det between skylines
water bottles but cannot
see peri yet

Dome d-d sucker moved
glass so all things
record NG.
Except colours dim Co
Eyes - can see at placin
to right of perpendicular
words 2 20 pm -



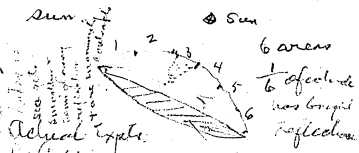
Its worst position for
ship to be between sun
& periscope, no shadows
on peri -

7 am - sea blue, sharp
horizon due to sea not
being glassy - peri
invisible.

934 - went to lee
saw Stern clear OK
clear sky line sharp
as fine ripples away
where sea green
no smooth spots
to mistake sky line

Let spot from telescope shine on a mirror & look at spot which can be followed as boat rolls — put on gimbals —

I notice today calm sea not green from no glassy surface.
That the bright reflection on water due to direct sun.

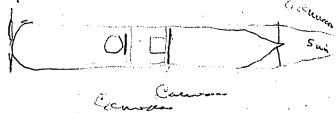


6 areas
1/6 of clouds
was bright
reflection

Actual type
by Capt Graham
1/16 of horizon
gotten in 2.03 inch circle
no white in boat

Can conceal smoke against sun by filling off funnels w/ Mg powder
both smoke below forming & making smoke until funnels 7%
Mg to 93% Lampblack

Adjustable Canopy for



Shadow Sail —
93% black 7%
white —

Then paint
Hull proper or
Sides of Canvas for side.

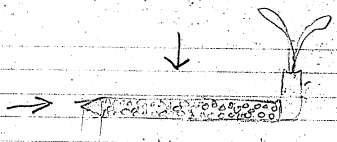
Instead of Mg powder when firing + make comm
use paper beside of Rog
funnel + fire. Photo Vapor
or other light white
powder - perhaps
should have an extra man
to watch + make the
smoke regulate thru
pipe -

Possibly distill
Lime + let it go up
hot pipe - possibly
China clay strongly
calcified -

It is possible by using
a nest of 5 telescopes +
focusing the image at Eye
piece by mirrors or prisms
We could darken the periscope
by superimposition +

brighten the skyline -
or not exactly superimpose
but put the 5 images of
periscope side by side
to make more Cheap

Think input Coal condition
should have priority -
Economy + Cost mechanical
by large air opening
+ all wires bare and
electric - + perhaps
separate batteries in each
tube for pilot or 1st Volt



8 ft long 1½ dia

1/8 holes. 1/16 wall thin rubber

Wave length at right angles
all diaphrm work simultaneously
Wave length end on short
than 4 ft as many diaphrm
go in and out + neutralize

3 Quantum —

[144]

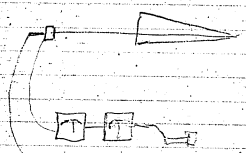
Hanford. L

Glenn Runs down gets out

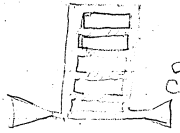
bullet wounds bullet.

Lieut Hart + Lieut Bloom
working on Mat.

Rig up Audion boxes for
W. Miller test Valves



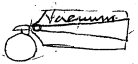
[145]



analogous to
Capacity &
impedance

[illegible] labs Can
[illegible]

Reg Rep Ln horn 2 1/2 × 5/5 — 1 ft
Rep slight Ln horn 2 1/2 5/5 2 ft 8"

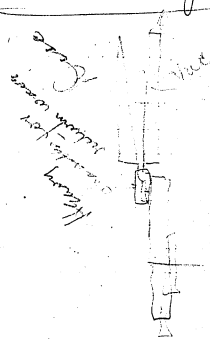


Reg funnel

think it will be louder
for recording
think it necessary for
under Water

~~[illegible]~~ Meats
Lieut Hart & Lieut Blow

position at sea at night
throw Coston light when
far enough astern
bring it by Compass
across under a star
forward angle



Periscope 48" high 4" dia
1200 yards gun on
deck 9-8 shots
4 hits — 1 hit for
every 2000 inches
Equivalent - at 2300 yards 1 hit 400 shots
on ~~whole gun~~ - 1 [illegible]

Think linseed or China
Wood oil mixed with Peroxide
lead or other easy reducing
+ with fibre + asbestos
Resin, will harden
in person + make a disc

The Vacuum Water funnel
30" long has a taper .86/100
of 1/8 of inches each inch
dia 2.8 big end
1/2 small end

Occasionally asphaltic neces to be
OK for ball made disc

Rosin an oxidized of abietic acid -
Lineoleate or chemically
Rosin processed + optimum
processed these will melt &
ice Rolls temp to get up to
softening of [illegible] of linseed & processed -
buy the fast dryer chemo for linseed

Carbonite Asphalt distillation
to raise softening point say
175 just soften, don't melt at
350.

Buy Decorel or simplex
button clock — also Vicol
second pendulum -

3 element @ 3 stage
42 on 4 amp 31 on 3 amp
Amplifier on Anderson directly
proportionalities To Amp on fils

~~anchored – [illegible] bottom~~
~~200 ft cable out~~
~~Noise 18 – [illegible] boat~~
~~[illegible] at [illegible]~~
~~[illegible] 2½ [illegible]~~
~~With [illegible] 18~~
~~Noise [illegible] 4~~
~~[illegible] boat~~
~~[illegible] 34 [illegible]~~

Cable [illegible]
400 ft out [illegible]
50 ft boat on bottom
~~Boat~~ anchored &
signal given for [illegible]
quiet at 18 @ 20
on box to [illegible]
noise 20 ft [illegible]
[illegible]

Two – double twisted
Cable –

When allowed to
rest on bottom 400
ft away & 600 ft paid
out noise was
28 on box. This
Extra 8 may be
moving of cable
by tide &
We now attach a
bag 5 lb sinker to
within 10 ft of
fish & rest on
bottom –

Known ways when boat
anchored & signal for no
noise given but heard
[illegible] in air at boat

with 500 ft wind 2 mm
cable a Extra buoys X
20 ft from fish
8 hear to 10 on buoy
Ranger 46 @ 48
Breathy, Eony 10 sec
gives a rumble then a
sharp then loud sump
then a musical low
note for 2 seconds
then quiet down to
a steady 32 [illegible]
underneath [illegible]
fine steam like
[illegible]
with only 250 ft and
9 hear only to 6
the breathing 20 to 30 seconds

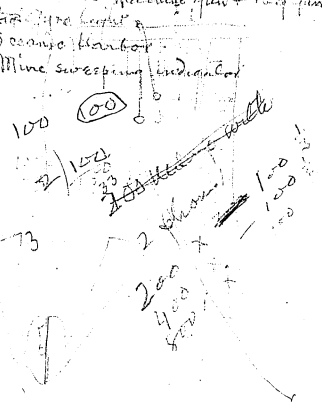
125
4000
500000

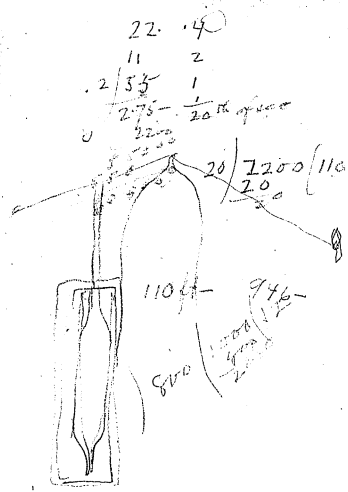
1000
125

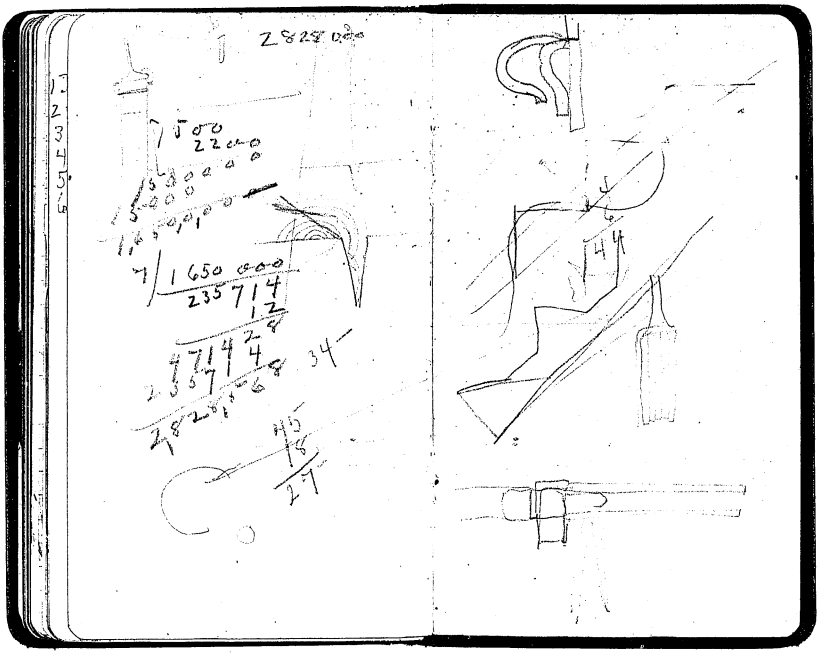
500 | 1000 | 125 | 87 5
500
2000
1500
500
1
4000
64
7000
2400
2400

87
4000
348

1 Towed Stone Sea Anchor
2 = Collision mats
3 Smoke bomb - Flare chute gun + Line gun
4 ~~Life~~ Life buoy
5 Oceanic Harbor
6 Mine sweeping Equipment






2825000
1500
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34
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27
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